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Date: December 21, 2022

Project Number: 19-009

Subject: 301 Mission Retrofit Supplemental Monitoring Report 085: Results as of December 19, 2022

CONTEXT

This supplemental memorandum summarizes results from the monitoring plan implemented at the 301 Mission property following the process established in a letter from Simpson, Gumpertz and Heger (SGH) to the San Francisco Department of Building Inspection (SFDBI) dated March 23, 2022. Instrumentation to temporarily monitor the structure during the excavation and shoring project phases was installed on April 20, 2022, including survey prisms installed at approximately one floor level above grade on the exterior of the building. This supplemental memorandum is for review only. It only contains ongoing monitoring information. This supplemental memorandum does not contain recommendations based upon the ongoing monitoring information.

PRESENTATION OF DATA

Figure S-01 presents the locations of the survey prisms (including both control and target prisms) as referenced in later figures.

Figure S-02 presents the differential horizontal movement toward the excavation at survey prisms installed at approximately one floor level above grade on the exterior of the building, as well as the average in each of the project north-south and east-west direction, since April 26, 2022, through December 12, 2022. Limits established in the aforementioned letter are included for reference.

Figure S-03 presents differential lateral roof deflection data due to shoring wall installation and excavation since April 26, 2022, through December 19, 2022. Limits established in the aforementioned letter are included for reference. Note that differential lateral roof deflection due to shoring wall installation and excavation is calculated following the aforementioned letter as:

$$\Delta_{R,NS} = \Delta_{R-prism,NS} - \Delta_{H,NS} - \alpha_0 T \quad (a)$$

$$\Delta_{R,NS} = \Delta_{R-prism,NS} - \Delta_{H,NS} - \alpha_{1,NS}(T - T_{1,NS}) - \alpha_0 T_{1,NS} \quad (b)$$

$$\Delta_{R,EW} = \Delta_{R-prism,EW} - \Delta_{H,EW} - \alpha_0 T \quad (c)$$

$$\Delta_{R,EW} = \Delta_{R-prism,EW} - \Delta_{H,EW} - \alpha_{1,EW}(T - T_{1,EW}) - \alpha_0 T_{1,EW} \quad (d)$$



where: Δ_R is the computed differential lateral roof deflection due to shoring wall installation and excavation during shoring wall installation (a or c) or during excavation (b or d) for the project north-south (a and b) and project east-west (c and d) directions;
 $\Delta_{R-prism}$ is the differential lateral roof deflection obtained from prism data for the project north-south (a and b) and project east-west (c and d) directions;
 Δ_H is the average differential horizontal movement “at-grade” for the project north-south (a and b) and project east-west (c and d) directions;
 α_0 is the weekly lateral roof deflection rate from the two months of monitoring conducted immediately prior to the shoring wall installation (i.e., monitoring data from February 22, 2022, through April 26, 2022);
 $\alpha_{1,NS}$ is the weekly lateral roof deflection rate from the two months of monitoring conducted immediately prior to starting the Mission Street excavation (i.e., monitoring data from August 15, 2022, through October 16, 2022);
 $\alpha_{1,EW}$ is the weekly lateral roof deflection rate from the two months of monitoring conducted immediately prior to starting the Fremont Street excavation (to be calculated once Fremont Street excavation starts);
 T is the number of weeks since initiation of shoring wall installation or excavation;
 $T_{1,NS}$ is the number of weeks between the initiation of shoring wall installation and starting the Mission Street excavation (i.e., between April 26, 2022, and October 18, 2022); and,
 $T_{1,EW}$ is the number of weeks between the initiation of shoring wall installation and starting the Fremont Street excavation (to be calculated once Fremont Street excavation starts).

Since the differential roof deflection calculation for the project north-south direction has been updated for previous weeks, the data is presented for both the updated (Figure S-03A) and the original (Figure S-03B) calculations for comparison this week. Comparison plots will not be plotted in subsequent memoranda.

Figure S-04 presents rates of differential lateral roof deflection data due to shoring wall installation and excavation since April 26, 2022, through December 12, 2022. Limits established in the aforementioned letter are included for reference. Note that the rates are calculated as:

$$\frac{d\Delta_R}{dT} \approx \frac{\Delta_{R,t} - \Delta_{R,t-1}}{T_t - T_{t-1}}$$

where: t is an index representing the current instance in time; and
 $t - 1$ is an index representing the previous instance in time.

Following the updated differential roof deflection rate calculation for the project north-south direction, the data is presented for both the updated (Figure S-04A) and the original (Figure S-04B) calculations for comparison this week. Comparison plots will not be plotted in subsequent memoranda. We acknowledge that the westward differential roof deflection rate increased from November 28, 2022, through December 12, 2022. We note that several rain episodes were recorded between December 2, 2022, and December 12, 2022, while minimal activity at the site was occurring. The differential roof deflection rate for the week of December 12, 2022, through December 19, 2022, showed eastward movement. No further rain episodes were recorded between December 12, 2022, and December 20, 2022.

CLOSING

Please contact us if you have any comments or questions, or if you would like to discuss the results presented in this memorandum.

FIGURES

Figure S-01A – Instrument Location Map: Horizontal Survey Control and Target Points at First Level



Figure S-02 – Differential Horizontal Movement Toward Excavation Since 04/26/2022 through 12/19/2022

Figure S-03A – Differential Lateral Roof Deflection Data due to Shoring Wall Installation and Excavation since 04/26/2022 through 12/19/2022

Figure S-03B – Differential Lateral Roof Deflection Data due to Shoring Wall Installation and Excavation since 04/26/2022 through 12/19/2022 Rate Not Updated

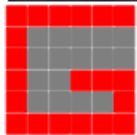
Figure S-04A – Rate of Differential Lateral Roof Deflection Data due to Shoring Wall Installation and Excavation since 04/26/2022 through 12/19/2022

Figure S-04B – Rate of Differential Lateral Roof Deflection Data due to Shoring Wall Installation and Excavation since 04/26/2022 through 12/19/2022 Rate Not Updated



DATES

2022/04/26-28: Fremont St. Shoring Pile Test Installation
2022/05/03: Fremont St. Shoring Pile Installation Start
2022/05/26: Fremont St. Shoring Pile Installation on Hold
2022/06/13: Mission St. Shoring Pile Installation Start
2022/08/05: Mission St. Shoring Pile Installation End
2022/09/08: Mission St. Jet Grouting Start
2022/10/05: Mission St. Jet Grouting End
2022/10/08: Fremont St. Shoring Pile Installation Resumed
2022/10/17: Mission St. Excavation Start
2022/11/12: Fremont St. Shoring Pile Installation End
2022/11/16: Mission St. Excavation to Mat Extension Depth
2022/12/07: Fremont St. Jet Grouting Start



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Project No. 0220-00383 HORIZONTAL TARGET EXHIBIT.dwg

EXHIBIT MAP

301 MISSION ST
COUNTY OF SAN FRANCISCO
STATE OF CALIFORNIA
APRIL 2022

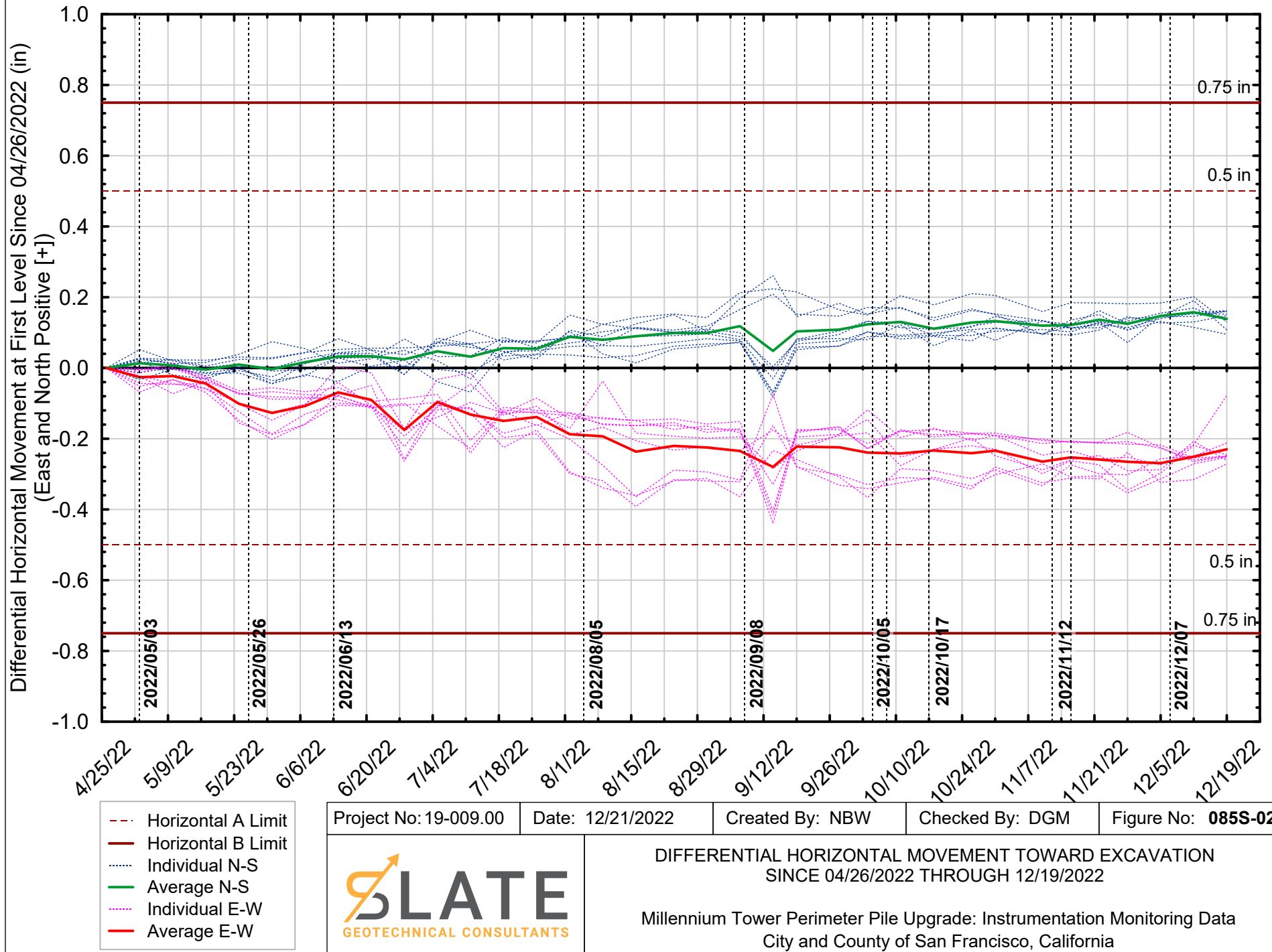
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on 04/26/2022

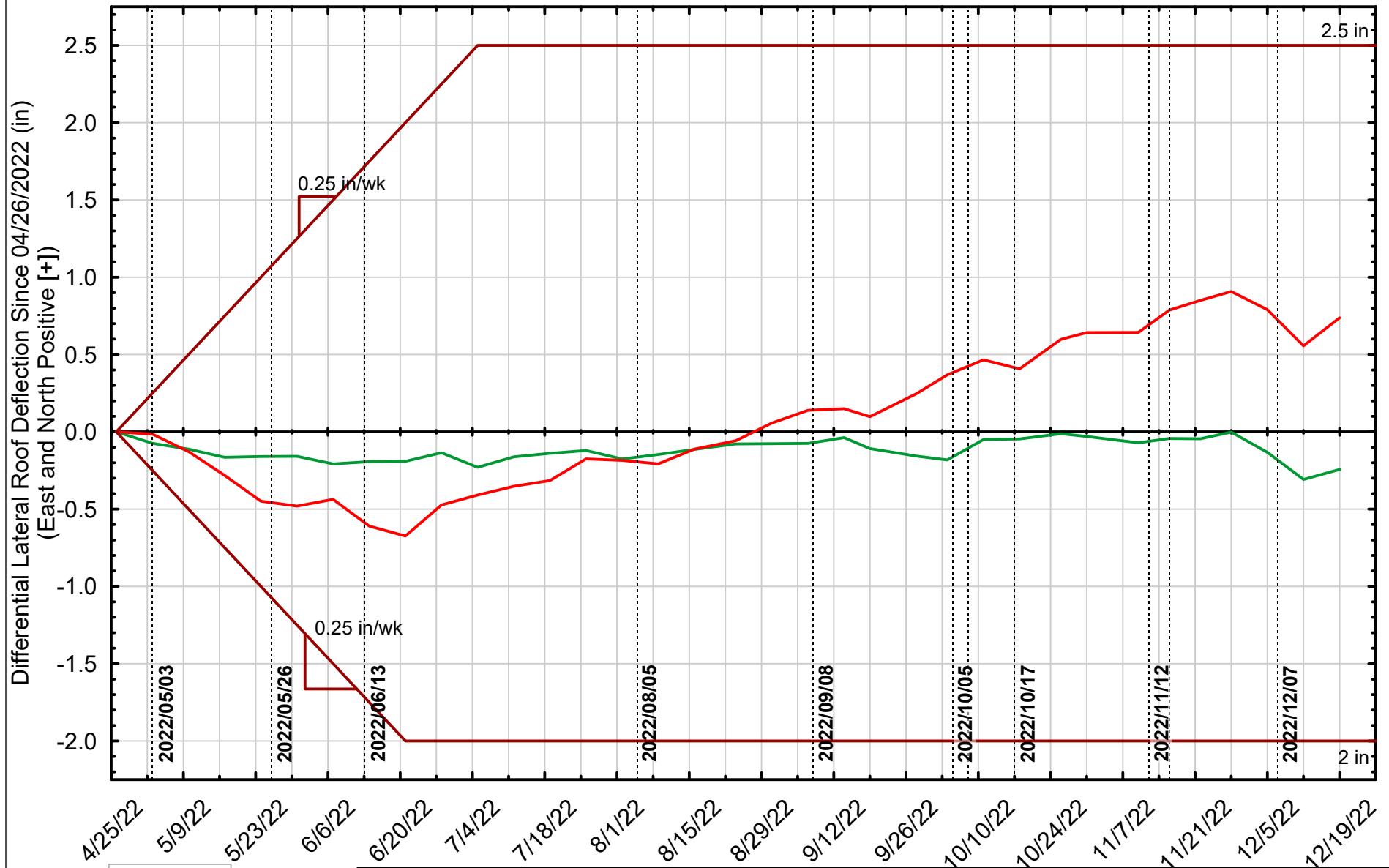
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INSTRUMENT LOCATION MAP
HORIZONTAL SURVEY CONTROL AND TARGET POINTS AT FIRST LEVEL

Millennium Tower Perimeter Pile Upgrade: Instrumentation Monitoring Data
City and County of San Francisco, California



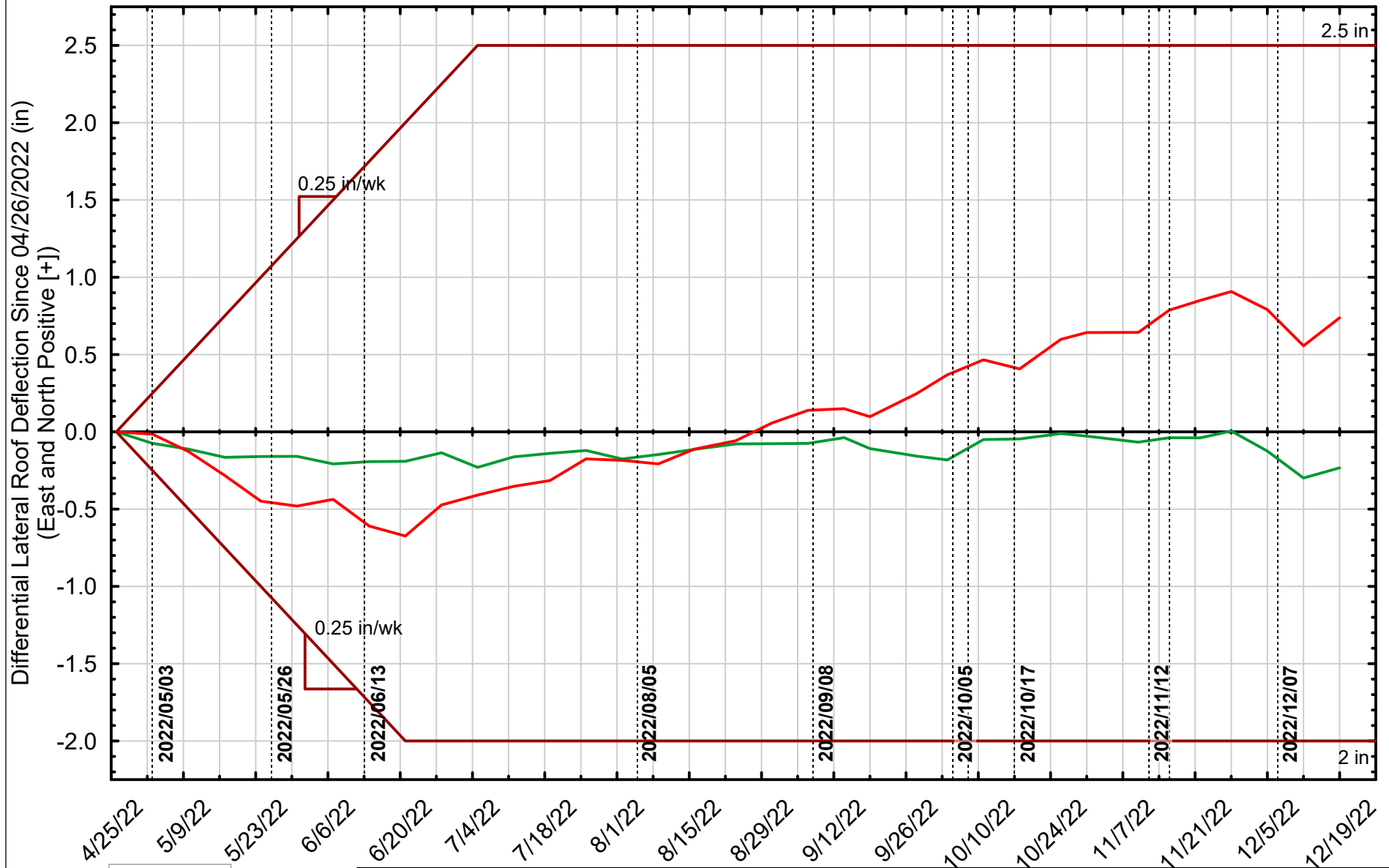


- Δ_R N-S
- Δ_R E-W
- Limit

Project No: 19-009.00	Date: 12/21/2022	Created By: NBW	Checked By: DGM	Figure No: 085S-03A
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DIFFERENTIAL LATERAL ROOF DEFLECTION DATA
DUE TO SHORING WALL INSTALLATION AND EXCAVATION
SINCE 04/26/2022 THROUGH 12/19/2022
Millennium Tower Perimeter Pile Upgrade: Instrumentation Monitoring Data
City and County of San Francisco, California

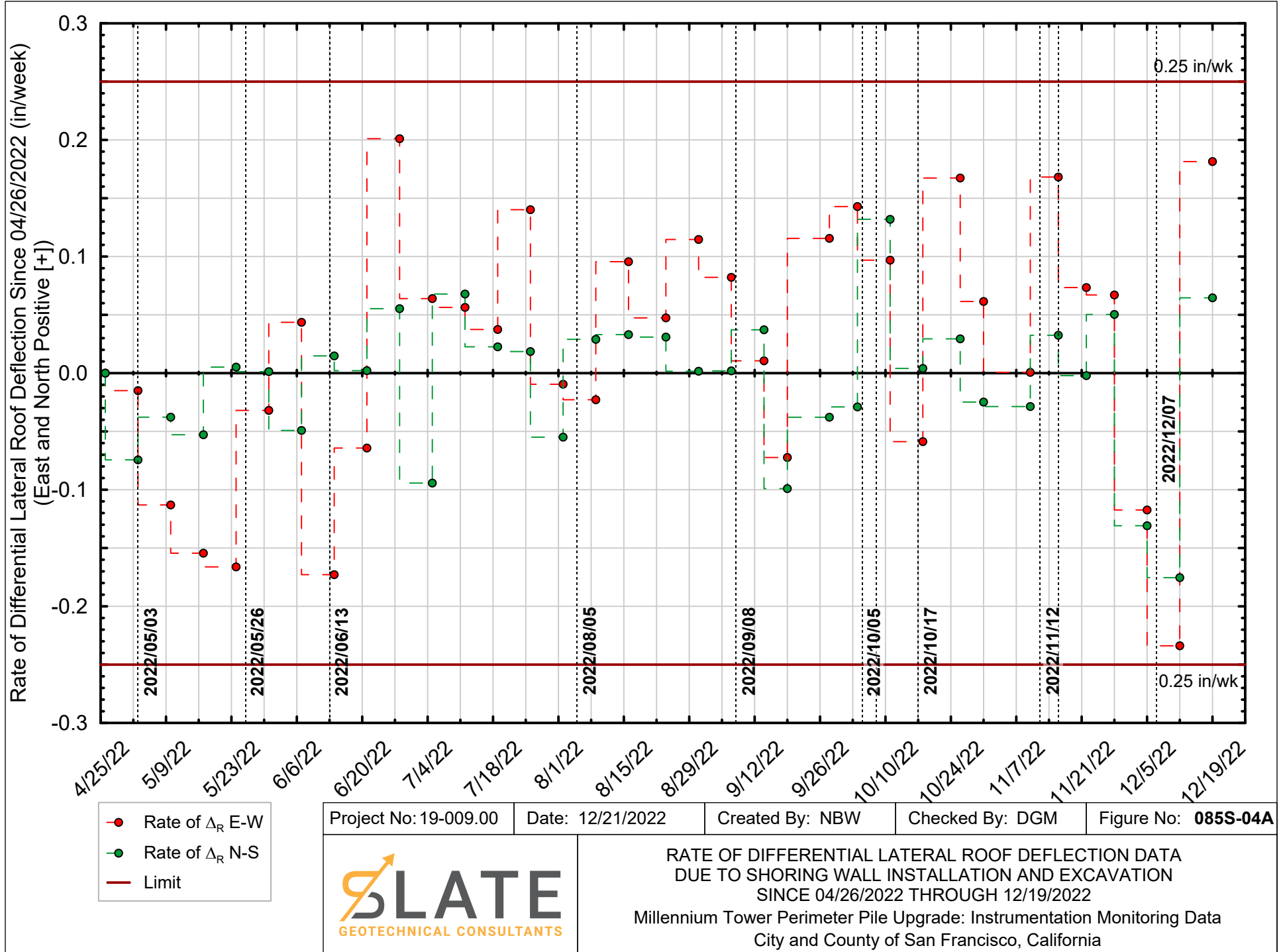


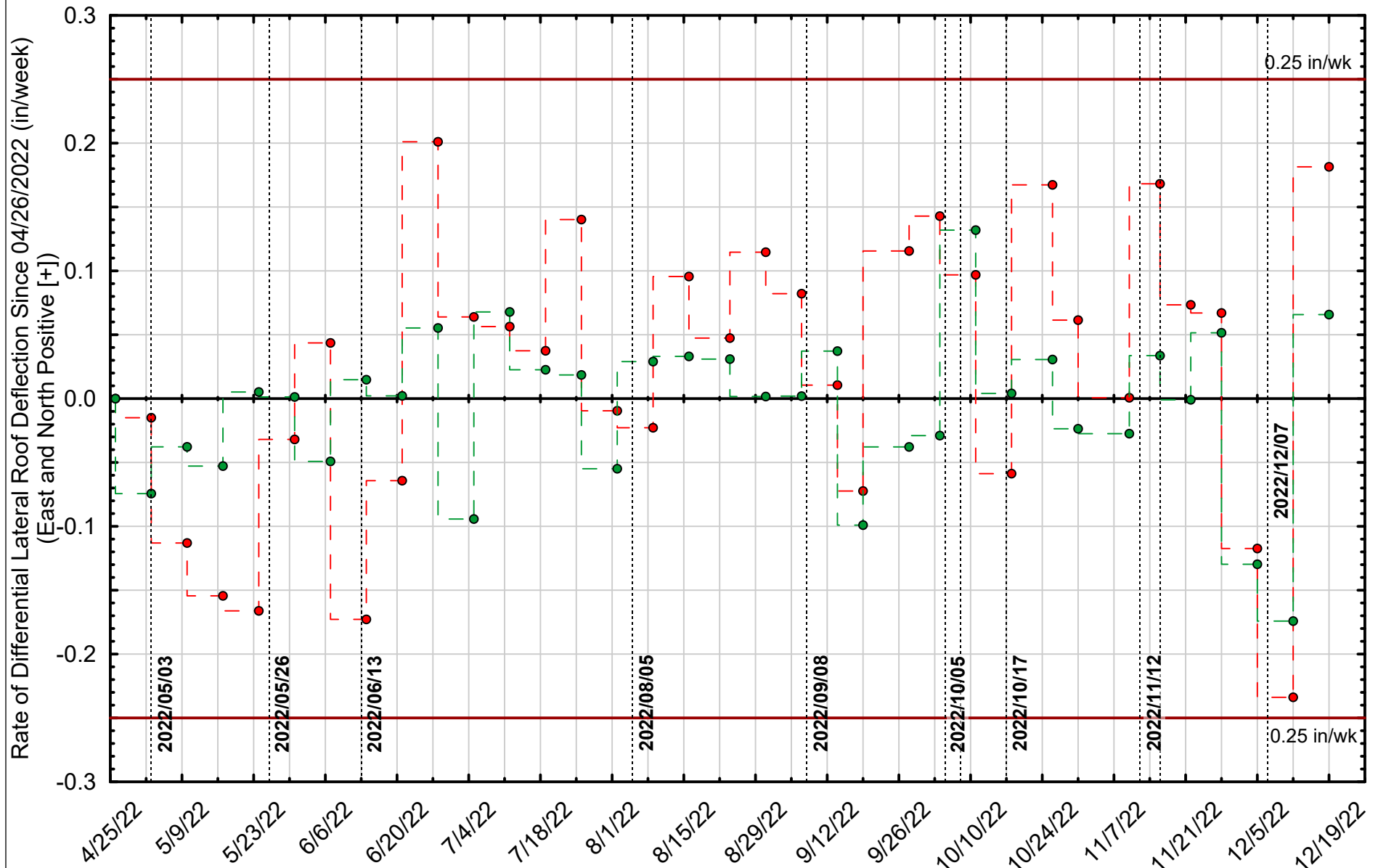
- Δ_R N-S
- Δ_R E-W
- Limit

Project No: 19-009.00	Date: 12/21/2022	Created By: NBW	Checked By: DGM	Figure No: 085S-03B
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DIFFERENTIAL LATERAL ROOF DEFLECTION DATA
DUE TO SHORING WALL INSTALLATION AND EXCAVATION
SINCE 04/26/2022 THROUGH 12/19/2022 - RATE NOT UPDATED
Millennium Tower Perimeter Pile Upgrade: Instrumentation Monitoring Data
City and County of San Francisco, California





- Rate of Δ_R E-W
- Rate of Δ_R N-S
- Limit

Project No: 19-009.00

Date: 12/21/2022

Created By: NBW

Checked By: DGM

Figure No: **085S-04B**



RATE OF DIFFERENTIAL LATERAL ROOF DEFLECTION DATA
DUE TO SHORING WALL INSTALLATION AND EXCAVATION
SINCE 04/26/2022 THROUGH 12/19/2022 - RATE NOT UPDATED
Millennium Tower Perimeter Pile Upgrade: Instrumentation Monitoring Data
City and County of San Francisco, California